

9.5 Powers & Roots of Complex Numbers

Name _____ Date _____ Period _____

Use DeMoivre's theorem to simplify the expression. Write answer in $a + bi$ form.

1. $\left(3(\cos 30^\circ + i \sin 30^\circ)\right)^3$

2. $\left(\sqrt{2}(\cos 120^\circ + i \sin 120^\circ)\right)^4$

3. $\left(\cos \frac{\pi}{12} + i \sin \frac{\pi}{12}\right)^8$

4. $\left(\sqrt{6}\left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}\right)\right)^4$

Simplify each expression by using trigonometric form and DeMoivre's theorem.

5. $(2 + 2i)^3$

6. $(-3-3\sqrt{3}i)^5$

7. $(2+3i)^4$

8. $(2-i)^4$

Find the indicated roots. Write the answer in trigonometric form.

9. Cube roots of $8(\cos 30^\circ + i \sin 30^\circ)$

10. Sixth roots of $64(\cos \pi + i \sin \pi)$

Find all specified roots in the form $a + bi$. Check by graphing the roots on the complex plane.

11. Fourth roots of 16

12. Cube roots of i

Find all complex solutions to each equation. Write the answer in $a + bi$ form.

13. $x^3 + 1 = 0$

14. $x^2 + 2i = 0$